AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1. (previously presented) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of weapons, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic;

a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stock over a life cycle of the weapons system, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stock as the dynamic objects traverse the network, said DES displaying the results of the simulation including the time-base prediction of weapons availability, maintenance activities and spare parts stock to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

2. (previously presented) The computer-implemented DES system of claim 1, wherein said attributes include a plurality selected from Birth Date, TTF variate, Duty Cycle, Warranty Cycle, Down Time, MTBF, BitDetectable, GodsEye and Weapon Variant common attributes.

3. (previously presented) The computer-implemented DES system of claim 2, wherein said common attributes include said MTBF, TTF variate and Duty Cycle each of which have a plurality of local values corresponding to different environments.

4. (cancelled)

5. (previously presented) The computer-implemented DES system of claim 1, wherein the simulation calculates a time-based prediction of warranted and not warranted maintenance activities.

6. (cancelled)

7. (previously presented) The computer-implemented DES system of claim 1, wherein the static objects comprise a plurality of primitive blocks and a plurality of common blocks that are organized in accordance with the SUP, said DES system including a library of common blocks including BIT, Stockpile Availability, Observe A_0, Operational Availability, Warranty Check, Set Failure Variates, Service Life Check and Parts Spares, wherein said network includes at least one said common block to support the calculation of the time-based predictions.

8. (previously presented) The computer-implemented DES system of claim 7, wherein said common blocks have common attributes including Birth Date, TTF variate, Duty Cycle, Warranty Cycle, Down Time, MTBF, BitDetectable, GodsEye and Weapon Variant.

9. (previously presented) The computer-implemented DES system of claim 7, comprising a library of sub-models including Test Effectiveness and Multiple Hardware Failure, Operational Availability, Reliability Growth and Degradation, and Predict Repair Maintenance, wherein the network comprises at least one sub-model to calculate the time-based predictions.

10. (previously presented) The computer-implemented DES system of claim 1, wherein the plurality of the static objects comprise primitive blocks and common blocks, said common blocks including Set Failure Variates and BIT and at least one of Stockpile Availability, Observe A_0~~,~~ and Operational Availability, Warranty Check, Service Life Check and Parts Spares, said dynamic objects having common attributes including at least Duty Cycle, TTF variate, BitDetectable, GodsEye, and MTBF.

11. (previously presented) The computer-implemented DES system of claim 10, wherein the included Stockpile Availability block calculates a measure A_s of the percentage of weapons in a stockpile that are ready for issue (RFI) as A_s = RFI / (Nd - Att) where Nd is the numbered delivered to the stockpile up to a point in time and Att is the attrition up to a point in time.

12. (previously presented) The computer-implemented DES system of claim 11, wherein the measure A_s is a numbers-based running average.

13. (previously presented) The computer-implemented DES system of claim 10, wherein, said Set Failure Variates block uses the MTBF as an input to randomly generate a value for the TTF attribute and randomly generates either a 0 or 1 for the BitDetectable attributes based on an overall test effectiveness probability.

14. (previously presented) The computer-implemented DES system of claim 13, wherein said Set Failure Variates block reads a plurality of MTBF attributes of one dynamic object corresponding to different environments to calculate a plurality of associated TTF attributes of one dynamic object for the different environments.

15. (previously presented) The computer-implemented DES system of claim 14, wherein the MTBFs increase as the weapons system matures but decrease as individual weapons age beyond their service life.

16. (previously presented) The computer-implemented DES system of claim 10, wherein said dynamic objects further includes Birth Date, common attributes, said included Service Life Check block using the Birth Date attributes and a Current Time primitive to calculate the age of the dynamic object and compare it to a service life, and if the age is greater than the service life either take the dynamic object out of service utilize degraded MTBF to recalculate TTF attributes as a function of its age.

17. (previously presented) The computer-implemented DES system of claim 16, wherein the

MTBF and TTF attributes increase as the weapons system matures but decrease as individual weapons age.

18. (previously presented) The computer-implemented DES system of claim 10, wherein said dynamic objects further include Birth Date and Down Time common attributes, said included Observe A_o block calculating a single point estimate A_0s of A_o as $A_0s = 1 -$ Down Time / (CurrentTime – Birth Date) where CurrentTime is a current time and a count of the number of observations to date.

19. (previously presented) The computer-implemented DES system of claim 18, wherein the included Operational Availability block calculates a running average A_0 from a plurality of single-point estimates A_0s observed at different points in the network weighted by a cumulative number of observations for each estimate.

20. (previously presented) The computer-implemented DES system of claim 10, wherein said BIT block performs a sequence of logical operations on the dynamic object to determine whether a false alarm failure occurs, whether a failure is detectable by the value of the BitDetectable attribute and whether the dynamic object's Duty Cycle is greater or less than its TTF.

21. (previously presented) The computer-implemented DES system of claim 20, wherein the BIT block generates one of the following outputs: (1) Un-failed dynamic object that has passed BIT, (2) Failed dynamic object that has passed BIT, (3) Un-failed dynamic object that has failed BIT; and (4) Un-failed dynamic object that has passed BIT, but has an undetectable defect.

22. (previously presented) The computer-implemented DES system of claim 20, wherein said TTF and Duty Cycle attributes have a plurality of values for different environments.

23. (previously presented) The computer-implemented DES system of claim 10, wherein said dynamic objects further include Warranty Cycle common attributes that accumulates time or cycles, said included Warranty Check block checking the Warranty Cycle attribute against a

warranty threshold for a failed dynamic object and indicating the failed dynamic object as warranted or not warranted.

24. (previously presented) The computer-implemented DES system of claim 23, wherein said warranty threshold and said Warranty Cycle attribute have a plurality of values for different environments.

25. (previously presented) The computer-implemented DES system of claim 10, wherein said dynamic objects have a plurality of failure modes that require different parts spares, said included Parts Spares block calculating a time delay for a failed dynamic object by calculating a random fault isolation delay, calculating the maximum replenishment delay for the multiple failure modes and calculating a random removal and replacement delay.

26. (previously presented) The computer-implemented DES system of claim 25, wherein dynamic objects resident to said Parts Spares Block represent rotable pools of available spare parts and which, when decremented, become unavailable as a spare to said dynamic objects entering the Parts Spares Block, requiring a time delay to be made available.

27. (previously presented) The computer-implemented DES system of claim 26, wherein said entering dynamic objects may experience delay due to unavailability of said resident dynamic objects, where delayed dynamic objects are held in a queue primitive providing delay time information.

28. (previously presented) The computer-implemented DES system of claim 26, wherein said resident dynamic objects are held in a resource primitive block when available to provide utilization information.

29. (previously presented) The computer-implemented DES system of claim 26, wherein a plurality of resident dynamic objects represent a plurality of failure modes for said dynamic objects entering Parts Spares Block.

30. (previously presented) The computer-implemented DES system of claim 10, wherein the network comprises at least one sub-model to calculate the time-based predictions, said sub-model comprising a plurality of common blocks having a relational topology and instruction set to perform a common function.

31. (previously presented) The computer-implemented DES system of claim 30, wherein a Test Effectiveness sub-model comprises the BIT common block that checks the BitDetectable attribute and compares the Duty Cycle to the TTF attribute to determine whether a dynamic object has failed and, if so, the Set Failure Variates common block resets the TTF, BitDetectable, and DutyCycle attributes.

32. (previously presented) The computer-implemented DES system of claim 30, where said dynamic objects further include Birth Date and Down Time common attributes, an Operational Availability sub-model comprising a plurality of Observe A_o blocks at different points in the network, each block calculating a single point estimate $A_o s$ of A_o as $A_o s$ = 1 – Down Time / (CurrentTime – Birth Date) where CurrentTime is a current time and recording a number of observations to date, and an Operational Availability block that calculates a running average A_o from the plurality of single-point estimates A_o s weighted by the cumulative number of observations for each estimate.

33. (previously presented) The computer-implemented DES system of claim 30, wherein a reliability growth and degradation sub-model comprises a Delivery primitive block that initializes the MTBF attribute, the Set Failure Variates block that randomly generates a TTF attribute and a plurality of Service Life Check blocks throughout the network that compare the age of the dynamic objects to the TTF attribute to pass or fail the dynamic object.

34. (previously presented) The computer-implemented DES system of claim 30, wherein said dynamic objects further include Warranty Cycle common attributes, said Predict Repair Maintenance sub-model comprising the Set Failure Variates block that initializes the TTF attribute, the BIT block that tests the accumulated Duty Cycle against the TTF attribute to pass

or fail the dynamic object, and a Warranty Check block that compares the Duty Cycle to the Warranty cycle to determine whether the failed dynamic object is warranted or not-warranted.

35. (previously presented) The computer-implemented DES system of claim 1, wherein the SUP describes a logical structure of delivery, maintenance, deployment and testing policy and infrastructure and logistics constraints.

36. (previously presented) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having Birth Date, Time-to-Failure (TTF) variate, Duty Cycle, Warranty Cycle, Down Time, MTBF, BitDetectable, GodsEye and Weapon Variant common attributes that represent characteristics of a weapon, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, each common block comprising a plurality of primitive blocks and/or other embedded common blocks configured to process the dynamic objects and global data to route the dynamic objects, modify the dynamic objects or perform a statistical or informational calculation for a defined common block function including each of BIT, Stockpile Availability, Observe A_0, Operational Availability, Warranty Check, Set Failure Variates, Service Life Check and Parts Spares;

a network of said primitive and common blocks that are organized in accordance with a service use profile (SUP) that describes a logical structure of delivery, maintenance, deployment and testing policy and infrastructure and logistics constraints to calculate a time-based prediction of stockpile and operational weapons availability, maintenance activities, and spare parts stock over a life cycle of the weapons system, said network having a global state;

a simulation engine that advances to the next change of said local or global states whereat said primitive and common blocks read and write said attributes in accordance with their functional operators and global data and said network updates the time-based predictions as the

dynamic objects traverse the network, said DES system displaying the results of the simulation including the time-base prediction of stockpile and operational weapons availability, maintenance activities, and spare parts stock to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

37. (previously presented) The computer-implemented DES system of claim 36, wherein the MTBF attribute has a plurality of values for different environments.

38. (previously presented) The computer-implemented DES system of claim 36, wherein the value of MTBF attribute increases as the weapons system matures but decrease as individual weapons age.

39. (previously presented) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of weapons, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, and including a Stockpile Availability common block that calculates a measure A_s of the percentage of weapons in a stockpile that are ready for issue (RFI) as $A_s = RFI / (Nd - Att)$ where Nd is the numbered delivered to the stockpile up to a point in time and Att is the attrition up to a point in time;

a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons stockpile availability over a life cycle of the weapons system, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons stockpile availability as the dynamic objects traverse the network, said DES system displaying the results of the simulation

including the time-base prediction of weapons stockpile availability to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

40. (previously presented) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of weapons including MTBF, Time-to-Failure (TTF) and BitDetectable attributes, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, and including a Set Failure Variates common block that uses the MTBF as an input to randomly generate a value for the TTF attribute and randomly generates either a 0 or 1 for the BitDectable attributes based on an overall test effectiveness probability;

a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons availability over a life cycle of the weapons system, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons availability as the dynamic objects traverse the network, said DES system displaying the results of the simulation including the time-base prediction of weapons availability to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

41. (previously presented) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of weapons including Birth Date, MTBF, and TTF attributes, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, and including a Service Life Check common block that uses the Birth Data and CurrentTime attributes to calculate the age of the dynamic object and compare it to a service life, and if the age is greater than the service life either take the dynamic object out of service or recalculate its MTBF and TTF attributes as a function of its age;

a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons availability over a life cycle of the weapons system, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons availability as the dynamic objects traverse the network, said DES system displaying the results of the simulation including the time-base prediction of weapons availability to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

42. (previously presented) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of weapons including Birth Date and Down Time attributes, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, and including an Observe A_o common block calculating a single point estimate A_0s of A_o as $A_0s = 1 - \text{Down Time} / (\text{CurrentTime} - \text{Birth Date})$ where CurrentTime is a current time and a count of the number of observations to date and an Operational Availability common block that calculates a running average A_0 from a plurality of single-point estimates A_0s observed at different points in the network weighted by a cumulative number of observations for each estimate;

a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons operational availability over a life cycle of the weapons system, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons operational availability as the dynamic objects traverse the network, said DES system displaying the results of the simulation including the time-base prediction of weapons operational availability to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

43. (previously presented) A computer-implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a weapons system, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of weapons including TTF, Duty Cycle and BitDetectable attributes, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects including primitive blocks and common blocks having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic, and including a BIT common block performing a sequence of logical operations on the dynamic object to determine whether a false alarm failure occurs, whether a failure is detectable by the value of the BitDetectable attribute and whether the dynamic object's Duty Cycle is greater or less than its TTF;

a network of said static objects that are organized in accordance with a service use profile (SUP) to calculate a time-based prediction of weapons availability over a life cycle of the weapons system, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons availability as the dynamic objects traverse the network, said DES system displaying the results of the simulation including the

time-base prediction of weapons availability to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

44. (previously presented) The computer-implement DES system of claim 36, wherein said dynamic objects have a plurality of failure modes that require different parts spares, said Parts Spares block calculating a time delay for a failed dynamic object by calculating a random fault isolation delay, calculating the maximum replenishment delay for the multiple failure modes and calculating a random removal and replacement delay.

45. (currently amended) A method of analyzing an operations and support (O&S) problem of a weapons system, comprising:

creating a model of the O&S problem based on a service use profile (SUP) that describes a logical structure of delivery, maintenance, deployment and testing policy and infrastructure and logistics constraints;

translating the model into a discrete ~~even~~ event simulation in which dynamic objects flow through a network of static objects that are organized in accordance with the model, said dynamic objects having common attributes with local values and said static objects having data that is global with respect to the dynamic objects and functional operators at least some of which are probabilistic;

executing the discrete event simulation by advancing to a next state whereat said static objects read and write said common attributes in accordance with their functional operators and global data and said simulation updates a time-based prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stock over a life cycle of the weapons system;

displaying the results of the simulation including the time-base prediction of weapons stockpile and operational availability, maintenance activities, and spare parts stock to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

46. (original) The method of claim 45, wherein said common attributes include a plurality

selected from Birth Date, Time-to-Failure (TTF) variate, Duty Cycle, Warranty Cycle, Down Time, MTBF, BitDetectable, GodsEye and Weapon Variant common attributes.

47. (original) The method of claim 46, wherein the MTBF attribute has a plurality of values for different environments.

48. (original) The method of claim 46, wherein the value of MTBF attribute increases as the weapons system matures but decrease as individual weapons age.

49. (cancelled)

50. (previously presented) The method of claim 45, wherein the plurality of the static objects comprise primitive blocks and common blocks, said common blocks including Set Failure Variates and BIT and at least one of Stockpile Availability, Observe A_{0}; and Operational Availability, Warranty Check, Service Life Check and Parts Spares, said dynamic objects having common attributes including at least Duty Cycle, TTF variate, BitDetectable and MTBF.

51. (previously presented) A computer implemented discrete event simulation (DES) system for the operations and support (O&S) problem of a Exoatmospheric Kill Vehicles (EKV) program, said DES system comprising:

a plurality of dynamic objects having attributes that represent characteristics of EKVS, said attributes having local values that define a local state of each dynamic object;

a plurality of static objects having data that is global with respect to the dynamic objects and functional operators, at least some of which are probabilistic;

a network of said static objects that are organized in three hierarchical blocks Delivery, Repair & Deployment; Silo Storage and Periodic Test; and Maintenance Returns in accordance with a service user profile (SUP) to calculate a time-based prediction of weapons availability over a life cycle of the EKV program to (1) decide between two competing maintenance concepts A and B for the program; (2) quantify repairs of EKV payloads; and (3) identify major spares requirements for EKV payloads return, said network having a global state; and

a simulation engine that advances to the next change of said local or global states whereat said static objects read and write said attributes in accordance with their functional operators and global data and update the time-based prediction of weapons availability as the dynamic objects traverse the network, said DES displaying the results of the simulation including the time-base prediction of weapons availability, maintenance activities and spare parts stock to a user through an interface to maintain an inventory of said weapons over the life cycle of the weapons system.

52. (previously presented) The computer-implemented (DES) system of claim 51, wherein said common attributes include a plurality selected from Birth Date, Time-to-Failure (TTF) variate, Duty Cycle, Warranty Cycle, Down Time, MTBF, BitDetectable, GodsEye and Weapon Variant common attributes.

53. (previously presented) The computer-implemented (DES) system of claim 52, wherein the MTBF attribute has a plurality of values for different environments.

54. (previously presented) The computer-implemented (DES) system of claim 52, wherein the value of MTBF attribute increases as the weapons system matures but decrease as individual weapons age.

55. (previously presented) The computer-implemented (DES) system of claim 52, wherein the static objects comprise a plurality of primitive blocks and a plurality of common blocks, each common block comprising a plurality of primitive blocks and/or other embedded common blocks configured to process the dynamic objects and global data to route the dynamic objects, modify the dynamic objects or perform a statistical or informational calculation for a defined block function to support the calculation of the time-based prediction.

56. (previously presented) The computer-implemented (DES) system of claim 55, wherein the plurality of common blocks include Set Failure Variates and BIT and at least one of, Stockpile Availability, Observe A_0, and Operational Availability, Warranty Check, Set Failure Variates, Service Life Check and Parts Spares.

57. (previously presented) The computer-implemented (DES) system of claim 1, wherein the time-base prediction of weapons availability, maintenance activities and spare parts stock is used to (1) decide between two competing maintenance concepts A and B for the weapons system; (2) quantify repairs of the weapons; and (3) identify major spares requirements for the weapons.

58. (previously presented) The method of claim 45, wherein the time-base prediction of weapons availability, maintenance activities and spare parts stock is used to (1) decide between two competing maintenance concepts A and B for the weapons system; (2) quantify repairs of the weapons; and (3) identify major spares requirements for the weapons.

59. (previously presented) The method of claim 45, wherein the static objects comprise a plurality of primitive blocks and a plurality of common blocks that are organized in accordance with the SUP, further comprising:

Providing a library of common blocks including BIT, Stockpile Availability, Observe A_0, Operational Availability, Warranty Check, Set Failure Variates, Service Life Check and Parts Spares, wherein said network includes at least one said common block to support the calculation of the time-based predictions.

60. (previously presented) The method of claim 50, wherein said Set Failure Variates block uses the MTBF as an input to randomly generate a value for the TTF attribute and randomly generating either a 0 or 1 for the BitDetectable attributes based on an overall test effectiveness probability.

61. (previously presented) The method of claim 50, wherein said BIT block performs a sequence of logical operations on the dynamic object to determine whether a false alarm failure occurs, whether a failure is detectable by the value of the BitDetectable attribute and whether the dynamic object's Duty Cycle is greater or less than its TTF.

62. (previously presented) The method of claim 50, wherein the included Stockpile Availability block calculates a measure A_s of the percentage of weapons in a stockpile that are

ready for issue (RFI) as A_s = RFI / (Nd - Att) where Nd is the numbered delivered to the stockpile up to a point in time and Att is the attrition up to a point in time.

63. (previously presented) The method of claim 50, wherein said dynamic objects includes Birth Date attributes, said included Service Life Check block using the Birth Data and CurrentTime attributes to calculate the age of the dynamic object and compare it to a service life, and if the age is greater than the service life either take the dynamic object out of service or recalculate its MTBF and TTF attributes as a function of its age.

64. (previously presented) The method of claim 50, wherein said dynamic objects include Birth Date and Down Time attributes, said included Observe A_o block calculating a single point estimate A_0s of A_o as A_0s = 1 – Down Time / (CurrentTime – Birth Date) where CurrentTime is a current time and a count of the number of observations to date and said included Operational Availability block calculating a running average A_0 from a plurality of single-point estimates A_0s observed at different points in the network weighted by a cumulative number of observations for each estimate.